TS EAMCET 2026 May 5 Shift 2

Question Paper with Solutions (Memory-Based)

Conducted by JNTU, Hyderabad

General Instructions

(i) The test is of 3 hours duration.

(ii) This test paper consists of 160 questions. The maximum marks are 720.

(iii) Physics and Chemistry contains 40 questions each and Biology (Botany and Zoology) contains 80 questions.

(iv) Each question carries +1 marks for correct answer and there is no negative marking for wrong answer.

1. The transfer cells are found in:

(A) Phloem

(B) Xylem

(C) Both phloem and xylem

(D) Epidermis

Correct Answer: (C) Both phloem and xylem

Solution:

Step 1: Concept

Transfer cells are specialized parenchyma cells characterized by ingrowths of the cell wall that greatly increase the surface area of the plasma membrane.

Step 2: Meaning

These cells are modified for efficient short-distance transport of solutes across the membrane.

Step 3: Analysis

They are commonly found in association with vascular tissues. In the phloem, they are involved in loading and unloading of photoassimilates. In the xylem, they help in the exchange of solutes between the xylem sap and surrounding tissues.

Step 4: Conclusion

Thus, transfer cells are strategically located in both phloem and xylem to facilitate intensive solute transport.

Final Answer: (C)

Quick Tip: Transfer cells = Increased surface area for "Transferring" solutes in vascular bundles.

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2. Which of the following shows the most primitive vascular system?

(A) Selaginella

(B) Psilotum

(C) Equisetum

(D) Lycopodium

Correct Answer: (B) Psilotum

Solution:

Step 1: Concept

Pteridophytes are vascular cryptogams. The complexity of their vascular system (stele) evolved over time.

Step 2: Meaning

A primitive vascular system refers to a simple arrangement, typically lacking complex features like leaves or roots, similar to the earliest land plants.

Step 3: Analysis

Selaginella, Equisetum, and Lycopodium have more advanced structural organizations. Psilotum (a whisk fern) is unique because it lacks true roots and leaves, possessing a very simple protostele.

Step 4: Conclusion

Due to its simple, ancestral-like morphology and vascular arrangement, Psilotum is considered

to have the most primitive vascular system among the options.

Final Answer: (B)

Quick Tip: Psilotum is often called a "living fossil" because of its extremely simple, rootless vascular structure.

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3. Photorespiration involves which sequence of organelles?

(A) Chloroplast → Mitochondria → Peroxisome
(B) Chloroplast → Peroxisome → Mitochondria
(C) Peroxisome → Chloroplast → Mitochondria
(D) Mitochondria → Peroxisome → Chloroplast

Correct Answer: (B) Chloroplast → Peroxisome → Mitochondria

Solution:

Step 1: Concept

Photorespiration (the C_2 cycle) is a wasteful pathway that occurs when RuBisCO fixes oxygen instead of carbon dioxide.

Step 2: Meaning

This process is complex and requires the coordination of three different cellular compartments to recycle the phosphoglycolate produced.

Step 3: Analysis

The process starts in the Chloroplast (formation of glycolate), continues in the Peroxisome (glycolate to glycine), and finally moves to the Mitochondria (release of CO_2 and formation of serine).

Step 4: Conclusion

The correct spatial sequence for these reactions is Chloroplast, followed by Peroxisome, then Mitochondria.

Final Answer: (B)

Quick Tip: Remember the mnemonic "CPm" (like CPM) → Chloroplast, Peroxisome, Mitochondria.

4. The respiratory quotient (RQ) of fats is:

(A) 1.0

(B) Greater than 1

(C) Less than 1

(D) 0

Correct Answer: (C) Less than 1

Solution:

Step 1: Concept

The Respiratory Quotient (RQ) is the ratio of the volume of CO_2 evolved to the volume of O_2 consumed during respiration.

Step 2: Meaning

The RQ value depends on the type of respiratory substrate being oxidized.

Step 3: Analysis

Carbohydrates have an RQ of 1.0. Fats are oxygen-poor molecules compared to carbohydrates, so they require more external oxygen for complete oxidation, resulting in less CO_2 produced per O_2 molecule used.

Step 4: Conclusion

For most fats (like tripalmitin), the RQ value is approximately 0.7, which is clearly less than 1.

Final Answer: (C)

Quick Tip: RQ values: Carbohydrates = 1.0, Fats ≈ 0.7, Proteins ≈ 0.9.

5. Entomophily (insect pollination) is found in:

(A) Maize

(B) Coconut

(C) Salvia

(D) Vallisneria

Correct Answer: (C) Salvia

Solution:

Step 1: Concept

Entomophily is a form of pollination where pollen is distributed by insects, such as bees or butterflies.

Step 2: Meaning

Entomophilous flowers usually have adaptations like bright colors, nectar, or fragrance to attract pollinators.

Step 3: Analysis

Maize and Coconut are typically wind-pollinated (anemophily). Vallisneria is an aquatic plant that uses water for pollination (hydrophily). Salvia is famous for its specialized "lever mechanism" to deposit pollen on bees.

Step 4: Conclusion

Therefore, Salvia is the correct example of an insect-pollinated plant.

Final Answer: (C)

Quick Tip: Salvia + Bees = Lever Mechanism. This is a classic example of Entomophily.

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6. Haemoglobin in RBCs is a:

(A) Glycoprotein

(B) Metalloprotein (chromoprotein)

(C) Lipoprotein

(D) Simple protein

Correct Answer: (B) Metalloprotein (chromoprotein)

Solution:

Step 1: Concept

Haemoglobin is a complex protein found in red blood cells (RBCs) responsible for transporting

oxygen throughout the body.

Step 2: Meaning

A metalloprotein is a protein that contains a metal ion cofactor. A chromoprotein is a conjugated protein that contains a pigmented prosthetic group.

Step 3: Analysis

Haemoglobin consists of globin proteins bound to heme groups. Each heme group contains an iron ion (Fe^{2+}), making it a metalloprotein. Because the heme group provides the red pigment to blood, it is also classified as a chromoprotein.

Step 4: Conclusion

Thus, haemoglobin is correctly identified as a metalloprotein (chromoprotein) due to its iron content and pigmented nature.

Final Answer: (B)

Quick Tip: Remember: "Heme" contains Iron (Metal) and gives color (Chrome), so it is a Metalloprotein and a Chromoprotein.

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7. Which of the following is a correct statement about the lac operon?

(A) It is constitutively expressed

(B) It is induced by lactose (allolactose)

(C) It codes for enzymes that metabolise glucose

(D) It is found in eukaryotes

Correct Answer: (B) It is induced by lactose (allolactose)

Solution:

Step 1: Concept

The lac operon is a gene system in bacteria (prokaryotes) required for the transport and metabolism of lactose.

Step 2: Meaning

Induction refers to the process where a specific molecule (inducer) stimulates the expression

of genes that are normally turned off.

Step 3: Analysis

Statement (A) is incorrect as the operon is inducible, not constitutive. Statement (C) is incorrect because it codes for enzymes to metabolize lactose, not glucose. Statement (D) is incorrect as operons are characteristic of prokaryotes.

Step 4: Conclusion

In the presence of lactose, allolactose acts as an inducer by binding to the repressor protein, allowing gene transcription to occur.

Final Answer: (B)

Quick Tip: Lac = Lactose. The operon only "turns on" (induced) when lactose is present and needs to be eaten!

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8. The process by which nitrogenous waste is removed in insects is:

(A) Kidneys

(B) Malpighian tubules

(C) Flame cells

(D) Contractile vacuoles

Correct Answer: (B) Malpighian tubules

Solution:

Step 1: Concept

Excretion is the biological process by which metabolic wastes, particularly nitrogenous ones, are eliminated from an organism.

Step 2: Meaning

Different animal groups have evolved specialized organs for excretion based on their environment and physiology.

Step 3: Analysis

Kidneys are found in vertebrates. Flame cells are found in Platyhelminthes (flatworms).

Contractile vacuoles are used by unicellular organisms like Amoeba. Malpighian tubules are the specific excretory structures found in insects like cockroaches.

Step 4: Conclusion

Malpighian tubules absorb nitrogenous waste from the haemolymph and convert it into uric acid for excretion via the hindgut.

Final Answer: (B)

Quick Tip: Associate "M" for Malpighian with "M" for Mosquitoes/Insects to remember the excretory organ.

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9. Colostrum is rich in:

(A) Carbohydrates

(B) IgA antibodies

(C) Lipids

(D) Minerals

Correct Answer: (B) IgA antibodies

Solution:

Step 1: Concept

Colostrum is the yellowish fluid secreted by mammary glands during the initial few days of lactation after childbirth.

Step 2: Meaning

It serves as the first form of protection for a newborn, providing essential nutrients and immune support.

Step 3: Analysis

While colostrum contains proteins and vitamins, its most critical biological component is a high concentration of Immunoglobulin A (IgA).

Step 4: Conclusion

These IgA antibodies provide passive immunity to the infant, protecting the infant's digestive

and respiratory tracts from pathogens.

Final Answer: (B)

Quick Tip: Colostrum = First Milk = First Immunity (IgA).

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10. Which of the following is an ectothermic animal?

(A) Mammals

(B) Birds

(C) Reptiles

(D) None of these

Correct Answer: (C) Reptiles

Solution:

Step 1: Concept

Animals are categorized as ectotherms or endotherms based on how they regulate their body temperature.

Step 2: Meaning

Ectotherms (cold-blooded) rely on external environmental sources to regulate body heat, whereas endotherms (warm-blooded) generate heat internally.

Step 3: Analysis

Mammals and birds are endotherms that maintain a constant internal temperature. Reptiles, amphibians, and most fish are ectotherms whose body temperature fluctuates with their surroundings.

Step 4: Conclusion

Reptiles often bask in the sun to gain heat, making them a classic example of ectothermic animals.

Final Answer: (C)

Quick Tip: Ecto = External. Ectotherms get heat from external sources (like the sun).

11. The rms speed of gas molecules is given by:

(A) $\sqrt{3RT/M}$

(B) $\sqrt{2RT/M}$

(C) $\sqrt{RT/M}$

(D) $3RT/M$

Correct Answer: (A) $\sqrt{3RT/M}$

Solution:

Step 1: Concept

The root-mean-square (rms) speed is the measure of the speed of particles in a gas, which is the square root of the average of the squares of the velocities.

Step 2: Meaning

It represents the speed of a molecule possessing average kinetic energy.

Step 3: Analysis

From the kinetic theory of gases, the average kinetic energy of a mole of gas is $\frac{3}{2}RT$. Since kinetic energy is also $\frac{1}{2}Mv^2$, equating the two gives $v_{rms} = \sqrt{\frac{3RT}{M}}$.

Step 4: Conclusion

Therefore, the correct mathematical expression for rms speed involves the square root of three times the product of the gas constant and temperature, divided by molar mass.

Final Answer: (A)

Quick Tip: Remember "3-R-T over M" under the root for RMS speed.

12. A p-n junction in reverse bias:

(A) Large current flows

(B) Depletion region widens, only tiny leakage current flows

(C) Depletion region narrows

(D) Breakdown occurs always

Correct Answer: (B) Depletion region widens, only tiny leakage current flows

Solution:

Step 1: Concept

Reverse biasing occurs when the n-side of a p-n junction is connected to the positive terminal and the p-side to the negative terminal of a battery.

Step 2: Meaning

This external voltage pulls majority carriers (holes and electrons) away from the junction.

Step 3: Analysis

As carriers move away, the layer of immobile ions at the junction grows, causing the depletion region to widen and the potential barrier to increase. This effectively blocks majority carrier flow.

Step 4: Conclusion

Consequently, only a very small reverse saturation current (leakage current) due to minority carriers flows through the junction.

Final Answer: (B)

Quick Tip: Reverse = Resistance. The region grows wider to resist current flow.

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13. Beats are produced by superposition of two waves with:

(A) Same frequency and amplitude

(B) Slightly different frequencies

(C) Opposite phases

(D) Same wavelength

Correct Answer: (B) Slightly different frequencies

Solution:

Step 1: Concept

Beats are the periodic fluctuations in the intensity of sound heard when two sound waves of nearly equal frequencies interfere with each other.

Step 2: Meaning

The "beat frequency" is the difference between the two original frequencies ($f_{beat} = |f_1 - f_2|$).

Step 3: Analysis

If frequencies are identical, we get a steady interference pattern, not beats. If frequencies are too different, the ear cannot distinguish the periodic pulses.

Step 4: Conclusion

Therefore, the specific condition for producing audible beats is that the superposing waves must have slightly different frequencies.

Final Answer: (B)

Quick Tip: Beats = Difference. The wah-wah sound comes from the small difference in frequencies.

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14. The half-life of a radioactive substance is 10 days. After 30 days, fraction remaining is:

(A) 1/4

(B) 1/8

(C) 1/2

(D) 1/16

Correct Answer: (B) 1/8

Solution:

Step 1: Concept

Half-life ($T_{1/2}$) is the time taken for half of the radioactive nuclei in a sample to decay.

Step 2: Meaning

The fraction remaining after n half-lives is given by the formula $(\frac{1}{2})^n$.

Step 3: Analysis

Given total time is 30 days and half-life is 10 days, the number of half-lives $n = \frac{30}{10} = 3$.

Step 4: Conclusion

Substituting $n = 3$ into the formula, the fraction remaining is $(\frac{1}{2})^3 = \frac{1}{8}$.

Final Answer: (B)

Quick Tip: 1 → 1/2 (10 days) → 1/4 (20 days) → 1/8 (30 days).

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15. A transformer: secondary turns = 2 × primary, input voltage = 220V. Output voltage is:

(A) 110 V

(B) 220 V

(C) 440 V

(D) 55 V

Correct Answer: (C) 440 V

Solution:

Step 1: Concept

For an ideal transformer, the ratio of voltages is equal to the ratio of the number of turns: $\frac{V_s}{V_p} = \frac{N_s}{N_p}$.

Step 2: Meaning

If $N_s > N_p$, it is a step-up transformer that increases voltage.

Step 3: Analysis

We are given $N_s = 2N_p$, so $\frac{N_s}{N_p} = 2$. This implies $V_s = 2 \times V_p$.

Step 4: Conclusion

Given input $V_p = 220V$, the output $V_s = 220 \times 2 = 440V$.

Final Answer: (C)

Quick Tip: Double the turns = Double the voltage.

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16. Which colligative property is used to determine molar mass of polymers?

(A) Boiling point elevation

(B) Freezing point depression

(C) Osmotic pressure

(D) Vapour pressure lowering

Correct Answer: (C) Osmotic pressure

Solution:

Step 1: Concept

Colligative properties depend on the number of solute particles in a solution.

Step 2: Meaning

For macromolecules like polymers, which have very high molar masses, the changes in boiling point or freezing point are too small to measure accurately at room temperature.

Step 3: Analysis

Osmotic pressure measurements are carried out at room temperature and yield significant, measurable values even for dilute solutions of polymers.

Step 4: Conclusion

Therefore, osmotic pressure is the preferred colligative property for determining the molar mass of polymers.

Final Answer: (C)

Quick Tip: High mass polymers need big pressure! Use Osmotic pressure because it gives measurable results at room temperature.

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17. Gas produced when copper reacts with dilute HNO_3:

(A) NO_2

(B) NO

(C) H_2

(D) NH_3

Correct Answer: (B) NO

Solution:

Step 1: Concept

The reaction of metals with nitric acid (HNO_3) depends on the concentration of the acid and

the nature of the metal.

Step 2: Meaning

Nitric acid acts as a strong oxidizing agent, typically producing nitrogen oxides rather than hydrogen gas.

Step 3: Analysis

When copper (Cu) reacts with dilute HNO_3, it follows the equation: $3Cu + 8HNO_3 \rightarrow 3Cu(NO_3)_2 + 2NO \uparrow + 4H_2O$. Concentrated HNO_3 would produce brown NO_2 gas instead.

Step 4: Conclusion

Thus, the colourless gas produced with dilute nitric acid is nitric oxide (NO).

Final Answer: (B)

Quick Tip: Dilute HNO_3 = NO (Nitric Oxide); Concentrated $HNO_3 = NO_2$ (Nitrogen Dioxide).

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18. Hybridisation of carbon in ethyne (acetylene) is:

(A) sp^3

(B) sp^2

(C) sp

(D) sp^3d

Correct Answer: (C) sp

Solution:

Step 1: Concept

Hybridization is determined by the number of sigma (σ) bonds and lone pairs around an atom.

Step 2: Meaning

In ethyne ($HC \equiv CH$), each carbon atom is triple-bonded to another carbon and single-bonded to a hydrogen.

Step 3: Analysis

Each carbon in ethyne forms 2 σ bonds (one with H and one with C) and 2 π bonds. A steric number of 2 corresponds to sp hybridization.

Step 4: Conclusion

This results in a linear molecular geometry with a bond angle of 180°.

Final Answer: (C)

Quick Tip: Triple bond = sp; Double bond = sp^2; Single bond = sp^3.

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19. Phenol is more acidic than alcohol because:

(A) O—H bond is weaker

(B) Phenoxide ion is resonance stabilised

(C) Phenol is a solid

(D) Higher molecular weight

Correct Answer: (B) Phenoxide ion is resonance stabilised

Solution:

Step 1: Concept

Acidity depends on the stability of the conjugate base formed after losing a proton (H^+).

Step 2: Meaning

When phenol loses H^+, it forms the phenoxide ion ($C_6H_5O^-$). Alcohols form alkoxide ions (RO^-).

Step 3: Analysis

In the phenoxide ion, the negative charge on oxygen is delocalized over the benzene ring through resonance, making it highly stable. Alkoxide ions have no such stabilization.

Step 4: Conclusion

The increased stability of the phenoxide ion drives phenol to release its proton more readily than alcohols.

Final Answer: (B)

Quick Tip: Stable conjugate base = Stronger acid. Resonance "spreads" the charge, making phenoxide very stable.

20. SN2 reactions are favoured by:

(A) Tertiary substrates

(B) Polar protic solvents

(C) Primary substrates and polar aprotic solvents

(D) Secondary substrates and heat

Correct Answer: (C) Primary substrates and polar aprotic solvents

Solution:

Step 1: Concept

S_N2 (Substitution Nucleophilic Bimolecular) reactions involve a single-step mechanism where the nucleophile attacks from the backside.

Step 2: Meaning

Because the attack happens simultaneously with the leaving group departing, steric hindrance must be minimized.

Step 3: Analysis

Primary substrates are least hindered, making them ideal for S_N2. Furthermore, polar aprotic solvents (like DMSO or acetone) do not solvate the nucleophile strongly, keeping it reactive.

Step 4: Conclusion

Tertiary substrates and polar protic solvents instead favor the S_N1 mechanism.

Final Answer: (C)

Quick Tip: S_N2 loves "space" (Primary) and "free" nucleophiles (Aprotic solvents).